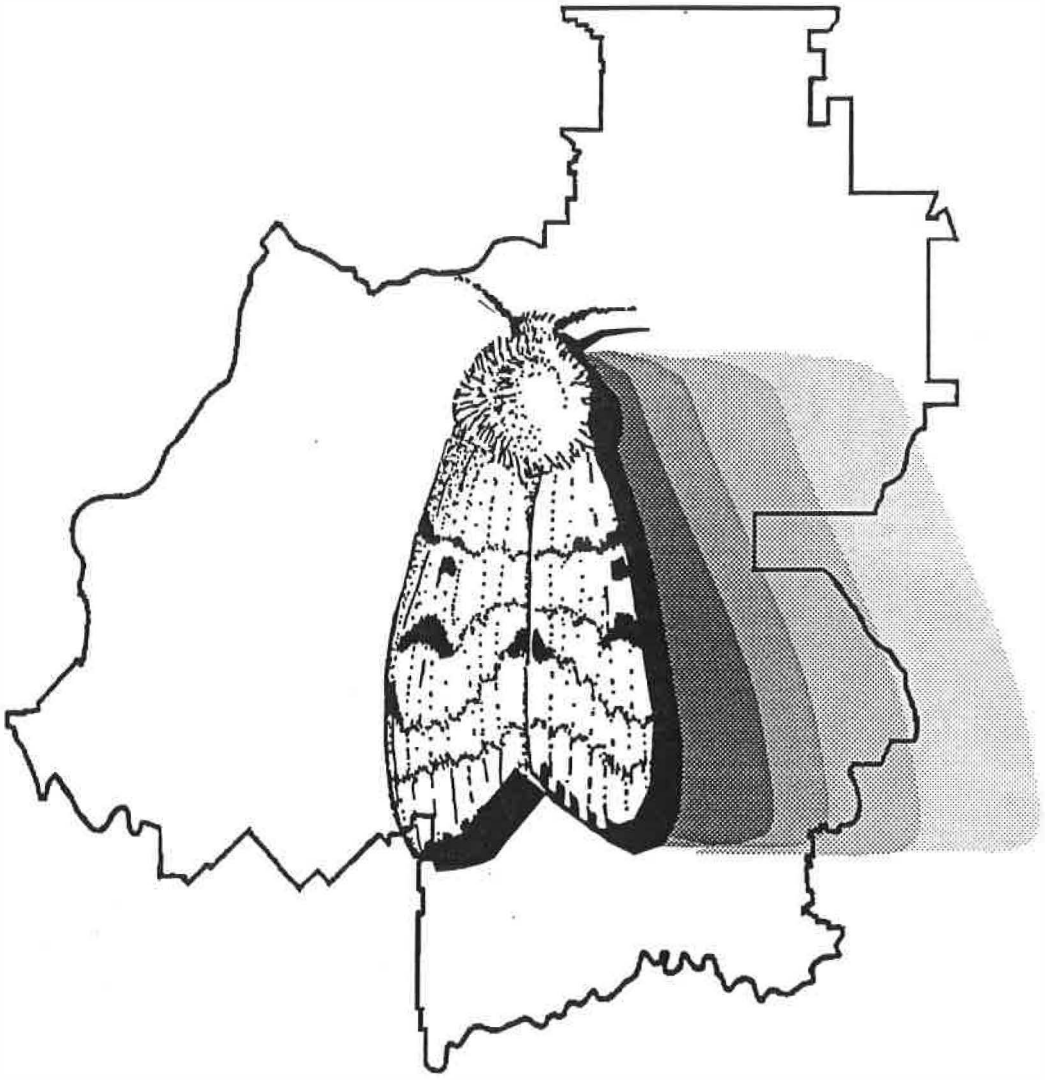
# BIOLOGICAL EVALUATION OF GYPSY MOTH POPULATIONS, ALLEGHENY NATIONAL FOREST, PENNSYLVANIA 1990




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NORTHEASTERN AREA
State and Private Forestry

# BIOLOGICAL EVALUATION OF GYPSY MOTH POPULATIONS, ALLEGHENY NATIONAL FOREST, PENNSYLVANIA 1990

## SUMMARY

Gypsy moth egg mass densities have again increased within most of the Allegheny National Forest (ANF). Several areas have population densities which approach, or exceed, minimum thresholds for spraying. Within individual Opportunity Areas (OAs), average egg mass densities ranged from 0 to 205 egg masses per acre. These averages for entire OAs are below minimum threshold levels; however, specific areas within several of the OAs have densities of 250-1140 egg masses per acre which meet, or exceed, minimum levels.

Areas of potentially defoliating populations should be considered for spraying during the spring of 1991 to prevent additional tree mortality, nuisance, and to maintain species diversity for wildlife.

## INTRODUCTION AND BACKGROUND

1990 is the first year since 1984 that no gypsy moth defoliation existed on the Allegheny National Forest. During the six year outbreak period, just over 210,000 acres were defoliated by the gypsy moth. As a result of the defoliation, substantial oak tree mortality has occurred within the Sheffield, Bradford, and Marienville Ranger Districts. This mortality has triggered extensive salvage sale operations to recoup value losses. Also there is concern among land managers on the ANF as to the affects of the mortality on the way the oak forest type should be managed. Tree mortality has also forced FPM to alter the location and process in which the oak forest type is sampled to estimate gypsy moth populations.

Originally, only high value timber stands and developed recreation sites were considered when planning ANF suppression projects. Following the oak mortality of 1987, priorities for selecting spray blocks are now based on maintaining the overall tree species diversity throughout the Forest.

## OBJECTIVES

The objectives of this biological evaluation were to accurately estimate gypsy moth population densities and, if necessary, to present recommendations for suppression.

## SURVEY PROCEDURES

During this year's survey, both 1/40th acre and five-minute walk techniques were used to estimate egg mass densities. The five-minute walk survey was designed to estimate the general population throughout an OA, while the 1/40th acre plot survey was designed to estimate the population in specific highly susceptible stands. Map 1 of Appendix B presents the opportunity areas on the Allegheny National Forest.

The number of five-minute walks that were distributed throughout any given Opportunity Area depended upon the total acreage of susceptible forest type in that OA. At each survey point, all egg masses were counted along a compass bearing for five minutes, survey personnel then retraced their steps and counted egg masses back along the same line; the two counts were averaged to get a single value for that plot. The count for each plot was then used in the formula:

$$Y = 20.56X + 14.58$$

where

Y = egg masses per acre

X = average of egg mass counts

The per acre values for each plot were then averaged for the entire Opportunity Area. Average per acre values are presented for each of the Opportunity Areas in Table 1, Appendix A.

Stands identified as having >50 percent white or chestnut oak were classified as being highly susceptible and were surveyed using 1/40th acre plots. Forty-three stands were selected and a series of 6, 1/40th acre plots established at 2-4 chain intervals within each stand. A range pole with a target at 5 feet was placed at plot center; the survey then used a 10 BAF prism to sight on the target and establish an 18.6 foot radius plot boundary. An imaginary cylinder was extended from the ground through the canopy and all egg masses within this cylinder are tallied. An average of the plot counts was multiplied by 40 (blow-up factor for 1/40th acre plot) to determine the egg mass density per acre for the stand. Average per acre values for the susceptible stands are shown in Table 2, Appendix A.

Additional information taken at these sample plots included the approximate percentage of oak in the stand by percent cover to help interpret variations in egg mass counts. Also, the general size of the egg masses and the presence of parasites (*Ooencyrtus* wasps) on the egg masses were noted as an indication of gypsy moth population health and whether it is declining or increasing.

The linear relationship between egg mass density and defoliation of host type have been published by David Gansner, NEFES, Radnor, PA, and were used to predict the potential 1991 defoliation; greater than 750 egg masses per acre can be expected to cause moderate defoliation (30-60 percent) and greater than 1500 egg masses per acre can result in severe defoliation (60-100 percent). In past projects, densities of 250 and 500 egg masses per acre have been used as minimum thresholds for treatment within developed recreation sites and visual corridors respectively. The average and range of defoliation potential for each of the opportunity areas is shown in Table 3, Appendix A.

## OBSERVATIONS AND CONCLUSIONS

Gypsy moth populations are increasing slightly throughout the Allegheny National Forest. Average per acre egg mass densities in the general OA survey ranged from 0 in R12L and R8H to 205 in M1L. Although these egg mass densities are below threshold levels for each OA as a whole, isolated "hotspots" exist where egg mass densities meet, or exceed, minimum suppression thresholds. Within the highly susceptible stands that were surveyed, egg mass densities averaged 167 per acre and ranged from 0 to 1140. Stands of lower susceptibility (<50 percent white or chestnut oak) had densities which averaged 90 egg masses per acre and ranged from 0 to 173. Maps 2-14, Appendix B, show the individual OAs that include these localized high population areas.

Along with the increase in population, the size and condition of the gypsy moth population on the ANF has increased. The average size of the egg masses this year are large with 14 percent egg parasitism. Last year's survey showed that egg masses were of medium size and egg parasitism averaged 60 percent.

Due to the upward shift in gypsy moth population vigor and density, the localized "hotspots" that exist, and the past history of gypsy moth on the Allegheny National Forest, suppression activities should be considered for FY 91. In addition, yearly detection and evaluation monitoring needs to be continued to insure that potentially explosive populations are detected.

## ALTERNATIVES AND POTENTIAL IMPACTS ON THE FOREST RESOURCE

Potentially damaging gypsy moth populations exist within 13 of the opportunity areas on the Forest and occur within stands managed for their tree species diversity, timber, and recreation. Basically, the ANF managers have two options:

1) no action
2) spray in selected areas to prevent nuisance, defoliation, and subsequent tree morality

If the no action alternative is chosen, the potential exists for nuisance and moderate defoliation in isolated areas across the ANF. Although research has shown that second outbreak episodes of gypsy moth result in reduced tree mortality rates, the Allegheny National Forest can ill afford additional oak mortality in previously defoliated stand. For this reason, consideration should be given to the suppression alternative. Forest resource values such as recreation, timber, and tree species diversity would be protected by suppressing building gypsy moth populations rather than waiting until a large scale outbreak develops.

# APPENDIX A

**Table 1.-- 1990 Gypsy moth egg mass survey results, Allegheny National Forest.**

| OA | Average EM/A | Egg Mass Size | Approx. % Oak on Plots | % of Plots with Parasites | 1990-91 Population Trend |
|---|---|---|---|---|---|
| B1M | 127 | Med/Large | 27 | 21 | Increasing |
| B2M | 53 | Large | 31 | 39 | Increasing |
| B7L | 44 | Med/Large | 33 | 17 | Increasing |
| B3M | 80 | Med/Large | 37 | 9 | Increasing |
| B8H | 31 | Med/Large | 11 | 23 | Increasing |
| M1L | 205 | Large | 55 | 15 | Increasing |
| M10M | 37 | Large | .3 | 0 | Increasing |
| M11M | 39 | Large | 7 | 6 | Increasing |
| M12M | 58 | Med/Large | 29 | 9 | Increasing |
| M5M | 39 | Large | 29 | 0 | Increasing |
| M4H | 135 | Large | 26 | 9 | Increasing |
| M7H | 97 | Large | 0 | 0 | Increasing |
| M3L | 121 | Large | 40 | 24 | Increasing |
| R11M | 24 | Large | 0 | 33 | Increasing |
| R12L | 0 | -- | 0 | -- | Decreasing |
| R8H | 0 | -- | 0 | -- | Decreasing |
| M12M | 64 | Med/Large | 19 | 19 | Increasing |
| S8L | 43 | Medium | 34 | 1 | Increasing |
| S12L | 44 | Med/Large | 28 | 0 | Increasing |
| S4H | 64 | Med/Large | 56 | 25 | Decreasing |
| S3H | 56 | Med/Large | 43 | 25 | Increasing |
| S16M | 94 | Medium | 37 | 13 | Increasing |
| S14M | 102 | Med/Large | 48 | 15 | Increasing |
| S15H | 68 | Medium | 47 | 0 | Increasing |

**Table 2.-- 1990 Gypsy moth egg mass survey results, Allegheny National Forest.**

| OA | Comp/ Stand | EM/A | Egg Mass Size | % Oak | Parasites |
|---|---|---|---|---|---|
| B1M | C1-S49 | 667 | Medium | 70 | Y |
| B2M | C47-S5 | 200 | Medium | 90 | N |
| B2M | C1-S13 | 87 | Medium | 40 | N |
| B2M | C1-S22 | 27 | Medium | 20 | N |
| B3M | C18-S19 | 40 | Medium | 75 | N |
| M1L | C6-S22 | 93 | Large | 65 | N |
| M3L | C3-S4 | 173 | Medium | 40 | y |
| M3L | C17-S1 | 60 | Medium | 70 | N |
| M3L | C17-S2 | 107 | Medium | 65 | N |
| M3L | C13-S30 | 220 | Large | 75 | N |
| M3L | C13-S25 | 80 | Medium | 60 | N |
| M5M | C20-S2 | 47 | Medium | 70 | N |
| M12M | C67-S23 | 107 | Large | 40 | N |
| M12M | C90-S5 | 220 | Large | 95 | N |
| M12M | C54-S5 | 207 | Large | 80 | N |
| M12M | C54-S3 | 280 | Large | 80 | N |
| M12M | C54-S6 | 107 | Large | 30 | N |
| M12M * | C105-S55 | 613 | Large | 80 | N |
| M12M * | C105-S57 | 1140 | Medium | 75 | Y |
| M12M * | C105-S47 | 393 | Medium | 70 | Y |
| S04H | C19-S36 | 273 | Small | 90 | N |
| S04H | C19-S38 | 20 | Medium | 85 | N |
| S04H | C18-S23 | 0 | -- | 60 | - |
| S04H | C24-S40 | 7 | Medium | 90 | N |
| S04H | C24-S42 | 20 | Medium | 90 | Y |
| S04H | C22-S8 | 7 | Medium | 70 | N |
| S04H | C4-S18 | 0 | -- | 70 | - |
| S04H | C4-S15 | 20 | Medium | 75 | N |
| S04H | C24-S13 | 0 | -- | 90 | - |
| S04H | C24-S17 | 47 | Medium | 75 | N |
| S09H | C27-S15 | 60 | Medium | 80 | N |
| S09H | C27-S19 | 180 | Medium | 80 | N |
| S09H | C27-S5 | 40 | Medium | 65 | N |
| S14M | C48-S5 | 120 | Medium | 80 | N |
| S15H | C154-S20 | 80 | Medium | 60 | Y |
| S15H | C151-S19 | 47 | Medium | 60 | N |
| S16M | C133-S2 | 207 | Large | 70 | Y |
| S16M | C81-S22 | 133 | Medium | 40 | Y |
| S16M | C81-S11 | 93 | Medium | 70 | N |
| S16M | C83-S1 | 87 | Medium | 70 | N |
| S16M | C128-S28 | 0 | -- | 0 | - |

*RIDGWAY RANGER DISTRICT

**Table 3.--1991 Gypsy moth outbreak predictions, Allegheny National Forest.**

| OA | Compartment Numbers | Net Acreage | Average | Range |
|---|---|---|---|---|
| B1M | 1-8 | 6,840 | Light | Very Light/Mod. |
| B2M | 1,18,20-24,27,29,32,41-44, 46,48 | 12,880 | Very Light | Very Light/Light |
| B7L | 48-52 | 3,840 | Very Light | Very Light |
| B3M | 9-17,41,46-48,50-58,76,78, 79,86,87,90,92,100 | 28,240 | Light | Very Light/Light |
| B8H | 25-28,30,31,40,44,45, 51-55 | 13,760 | Very Light | Very Light |
| M1L | 1-6,11,15,16,18 | 7,323 | Light | Light |
| M10M | 49,61,74,80-83,70,72,73, 62,64 | 13,280 | Very Light | Very Light |
| M11M | 50-59,62-64,67,69,70-72,77, 78,92-96,105,106 | 2,223 | Very Light | Very Light |
| M12M | 55,62,65,66,104,106 | 3,760 | Very Light | Very Light/Light |
| M5M | 20,22,25-28 | 4,960 | Very Light | Very Light |
| M4H | 22-24,27-31,33-35,38 | 6,800 | Light | Very Light/Light |
| M7H | 29,30,33-45,47-53,75,76 | 28,280 | Light | Very Light/Light |
| M3L | 2,7-10,12-14,16-19 | 6,360 | Light | Very Light/Light |
| R11M | 88,90-95,3 | 7,245 | Very Light | Very Light |
| R12L | 85,86,96,97,100,101,108 | 8,714 | Very Light | Very Light |
| R8H | 65,66,70,71,83-84,97,99 | 10,855 | Very Light | Very Light |
| M12M* | 105,107,109-114 | 9,717 | Light | Light/Moderate |
| S8L | 90-95,118,119,155 | 6,840 | Very Light | Very Light |
| S12L | 9-12 | 2,040 | Very Light | Very Light |
| S4H | 4-9,18-24,28,29 | 11,400 | Light | Very Light/Light |
| S3H | 10-16,32-35,37-39,63,64 86-94 | 18,120 | Very Light | Very Light |
| S16M | 1-4,6,25,27,49-51,81-84, 128-138,144,146-148 | 13,680 | Light | Very Light/Light |
| S14M | 3,28,48,53-55,76-78 | 6,320 | Light | Very Light/Light |
| S15H | 89,120-122,135,136,138-141, 145,150-154 | 11,840 | Light | Very Light/Light |

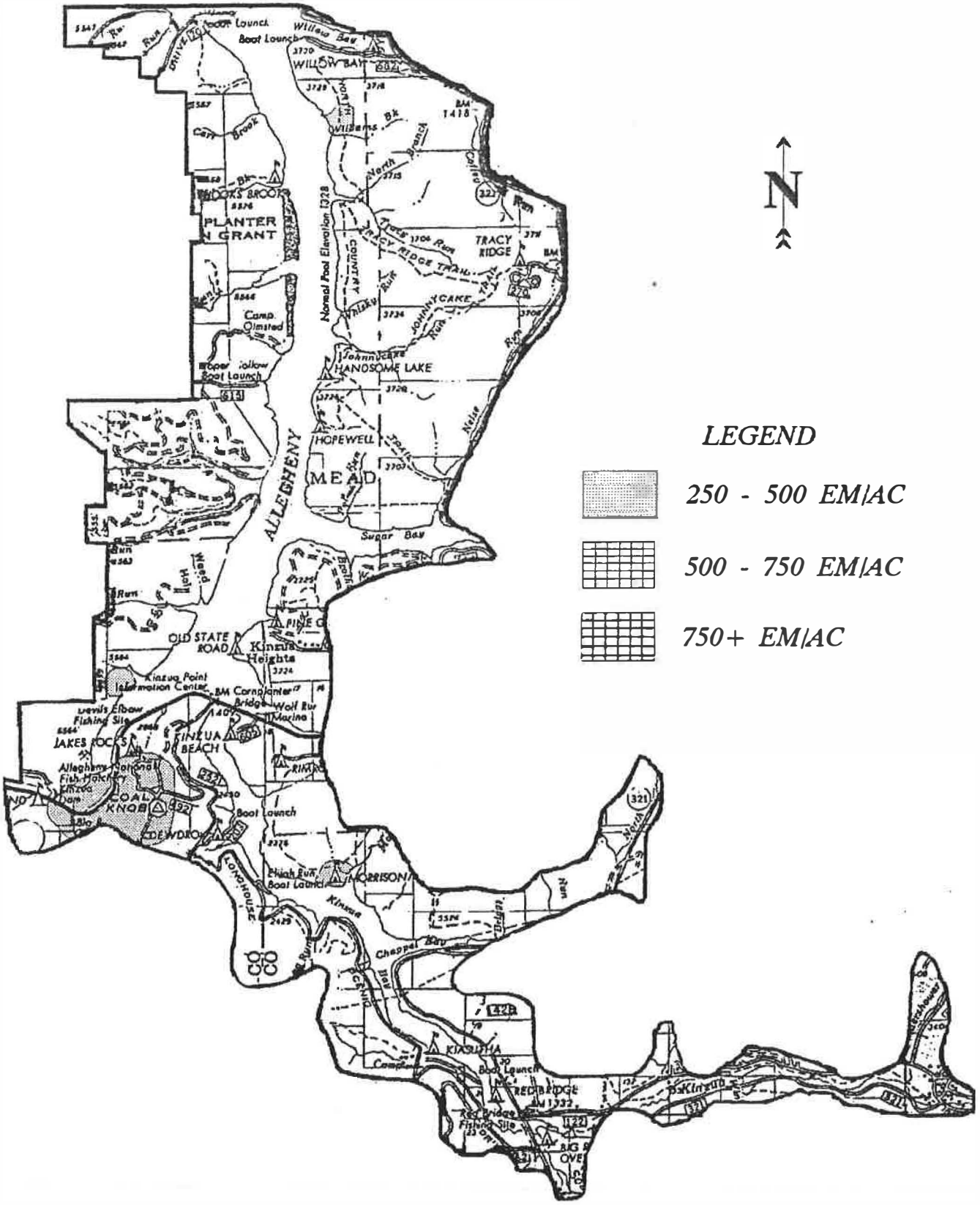
*Ridgway Ranger District

# APPENDIX B

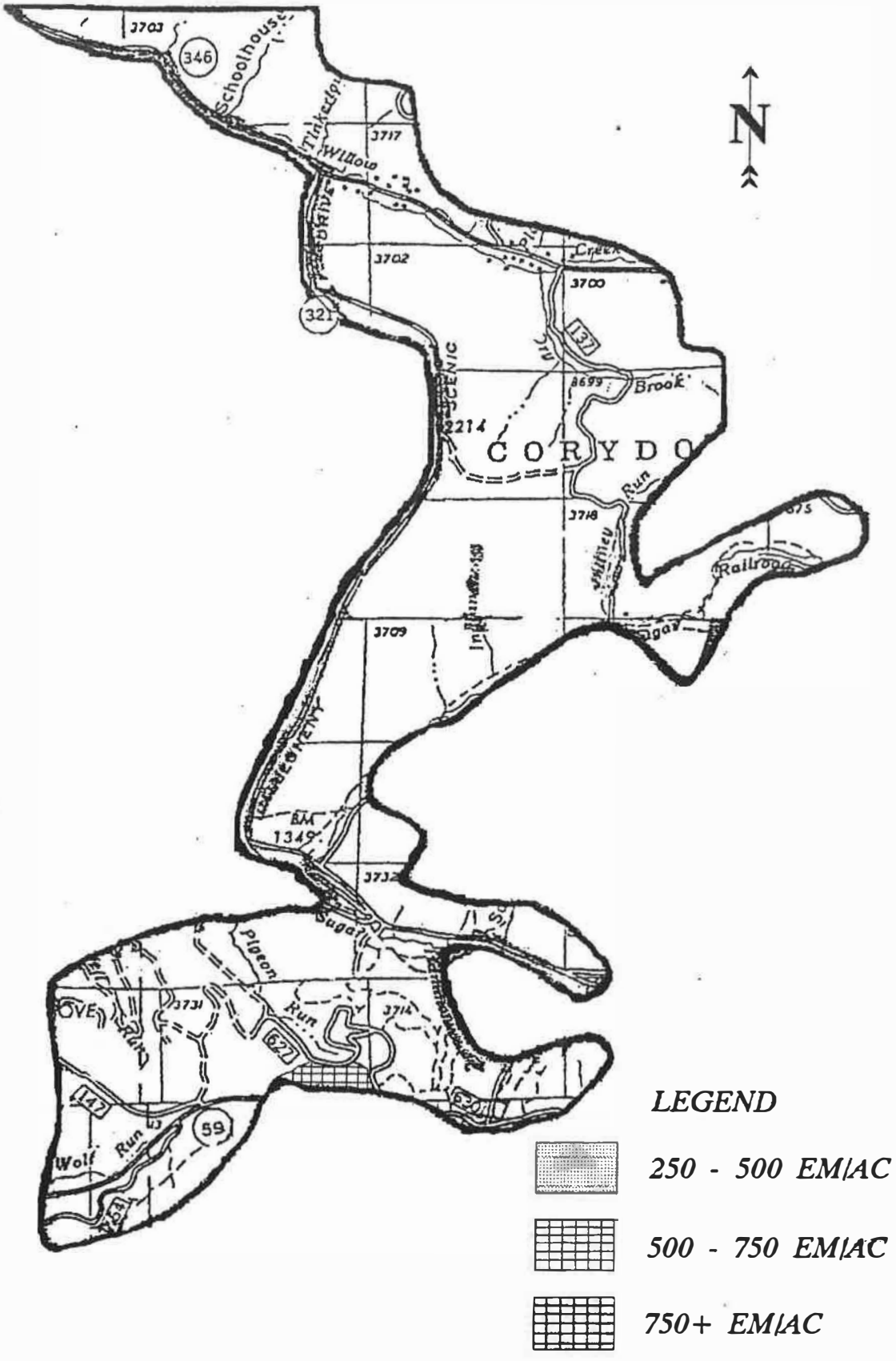
Map 1.--Opportunity Areas, Allegheny National Forest



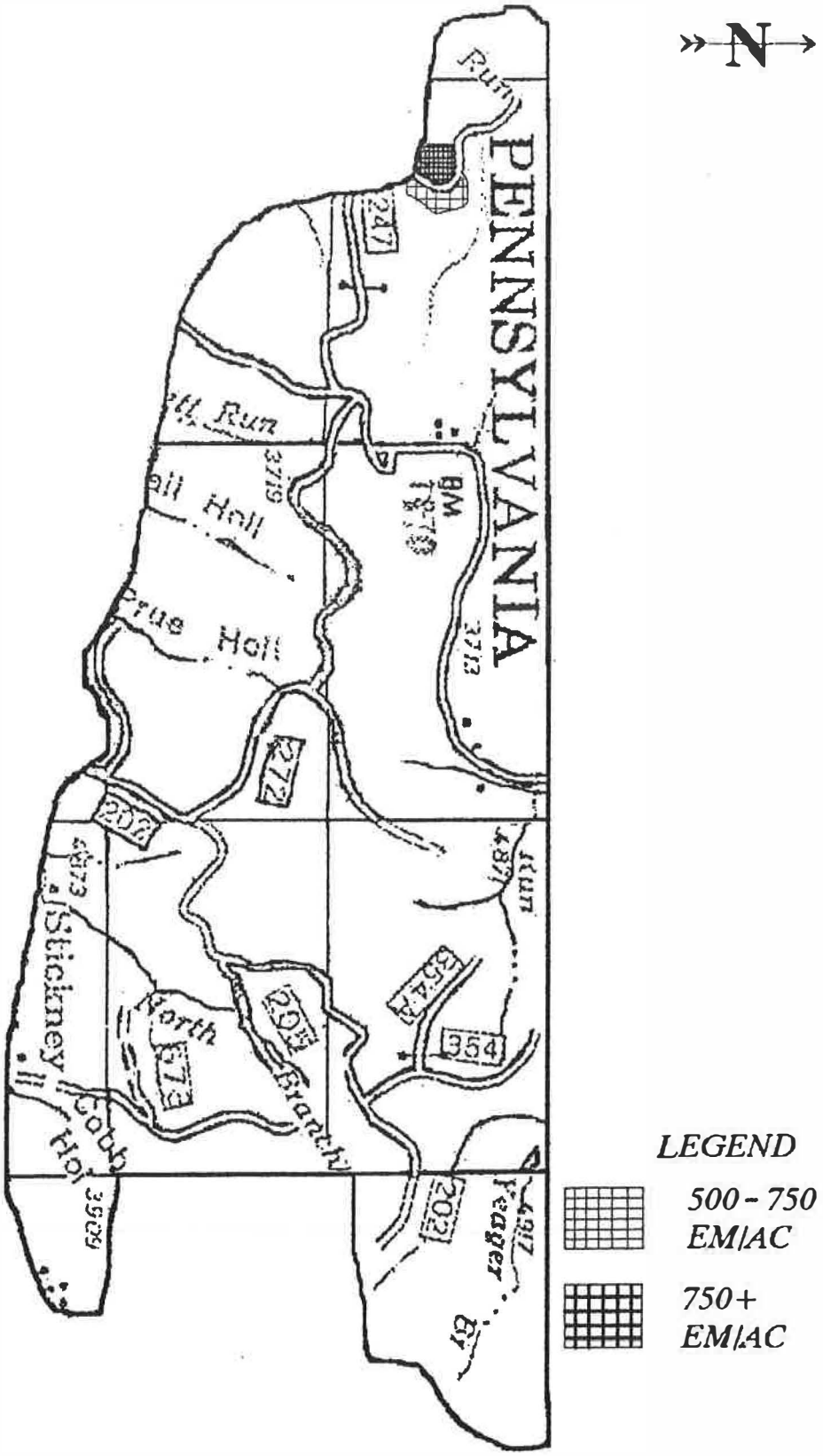
Opportunity Area B03M, Allegheny National Forest,
Egg Mass Densities, November 1990


N
LEGEND
250 - 500 EM/AC
500 - 750 EM/AC
750+ EM/AC
ALLEGHENY
MEAD
HOPEWELL
HANDSOME LAKE
TRACY RIDGE
PLANTER
N GRANT
WILLOW BAY
Willow Bay
Boat Launch
Camp Olmsted
Upper Willow
Boat Launch
Sugar Bay
OLD STATE ROAD
Kinzua Heights
Kinzua Point
Information Center
Cornplanter
Bridge
Wolf Run
Marina
JAKES ROCK
KINZUA
BEACH
COAL
KNOB
Allegheny National
Fish Hatchery
Kinzua
Dam
Boat Launch
LONGHOUSE
Elijah Run
Boat Launch
MORRISON
Chappel Bay
KIASUTHA
Boat Launch
RED BRIDGE
Red Bridge
Fishing Site
Johnny Cake
Run
Whisky
Run
Camp
Run
Collins
Run
Williams
Bk
North
Branch
Tracy
Run
Tracy Ridge Trail
Johnny Cake
Trail
Normal Pool Elevation 1328
Country
Trail
Nelse
Run
Broad
Run
Weed
Run
Halfway
Run
Kinzua
Creek
Chappel
Run
Big
Run
North
Run
Elijah
Run
Big
Run
Big
Run
Big

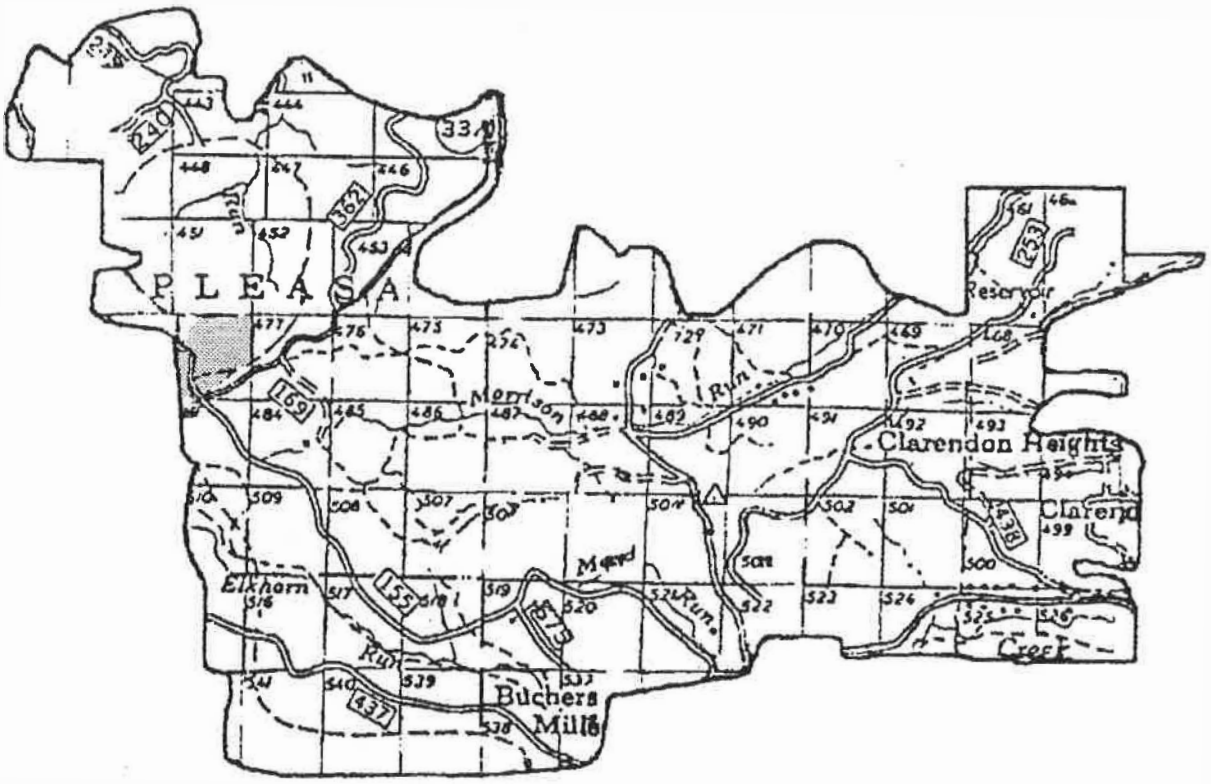
Opportunity Area B02M, Allegheny National Forest,
Egg Mass Densities, November, 1990



Opportunity Area B01M, Allegheny National Forest,
Egg Mass Densities, November, 1990



Opportunity Area S04H, Allegheny National Forest,
Egg Mass Densities, November, 1990



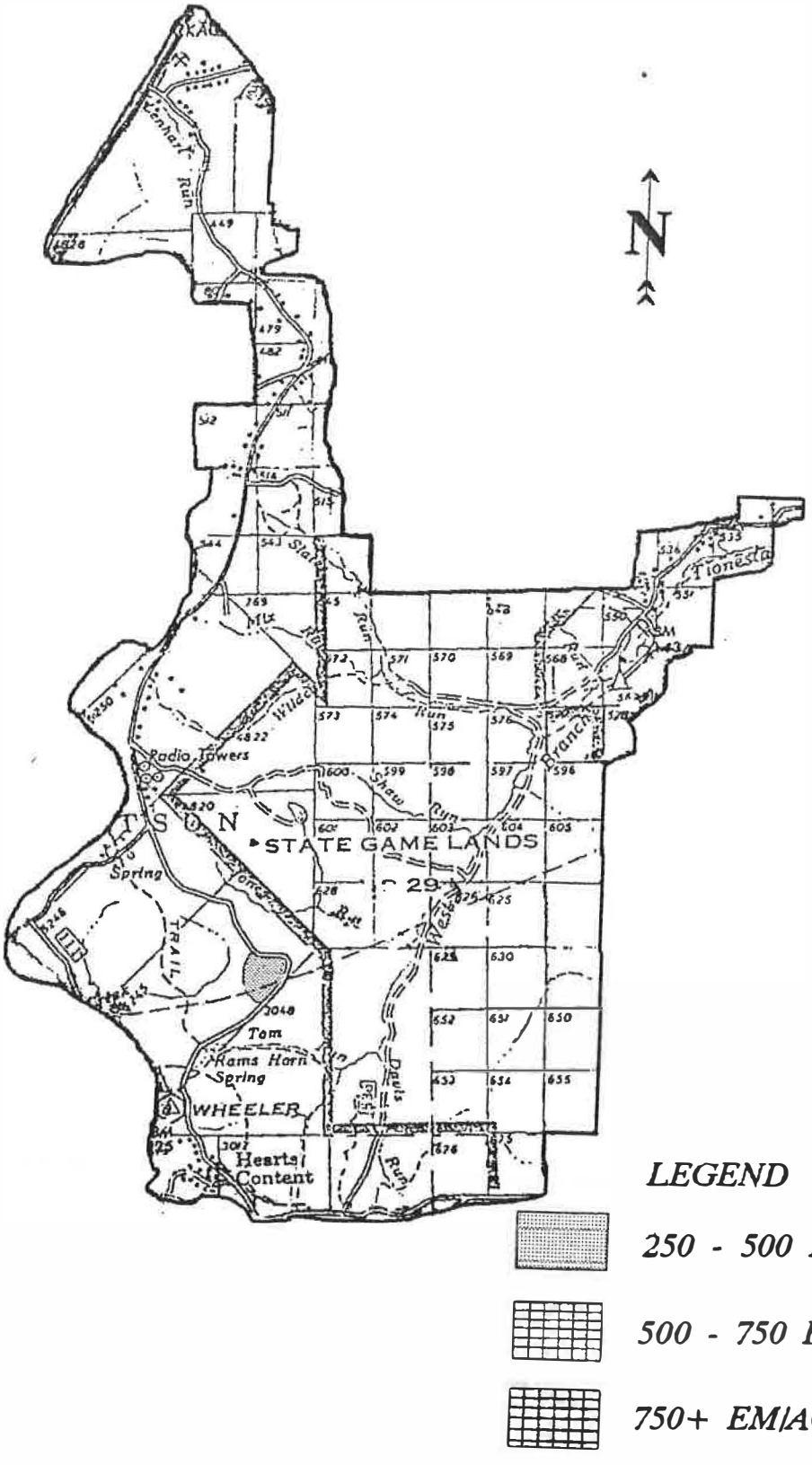

*LEGEND*

*250 - 500 EM/AC*

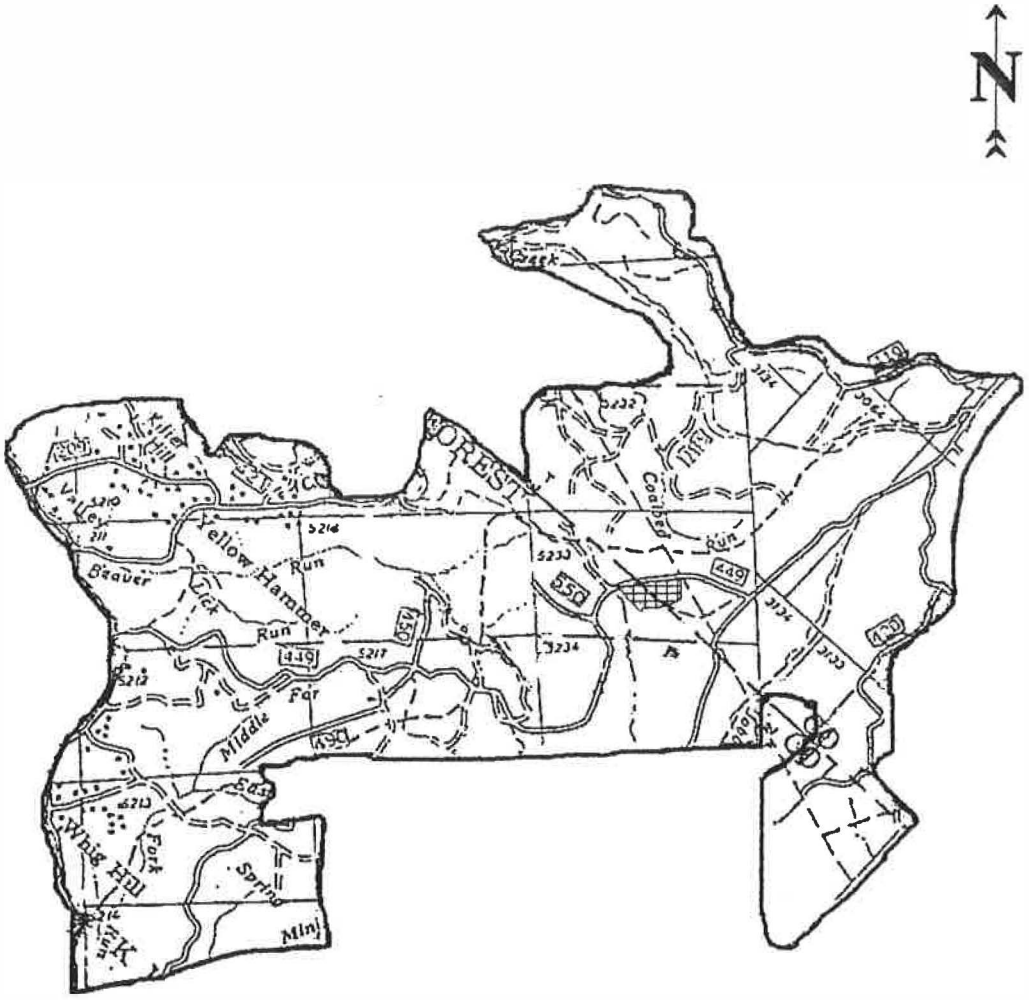
*500 - 750 EM/AC*

*750+ EM/AC*

Opportunity Area S14M, Allegheny National Forest,
Egg Mass Densities, November, 1990



Opportunity Area S15H, Allegheny National Forest,
Egg Mass Densities, November, 1990



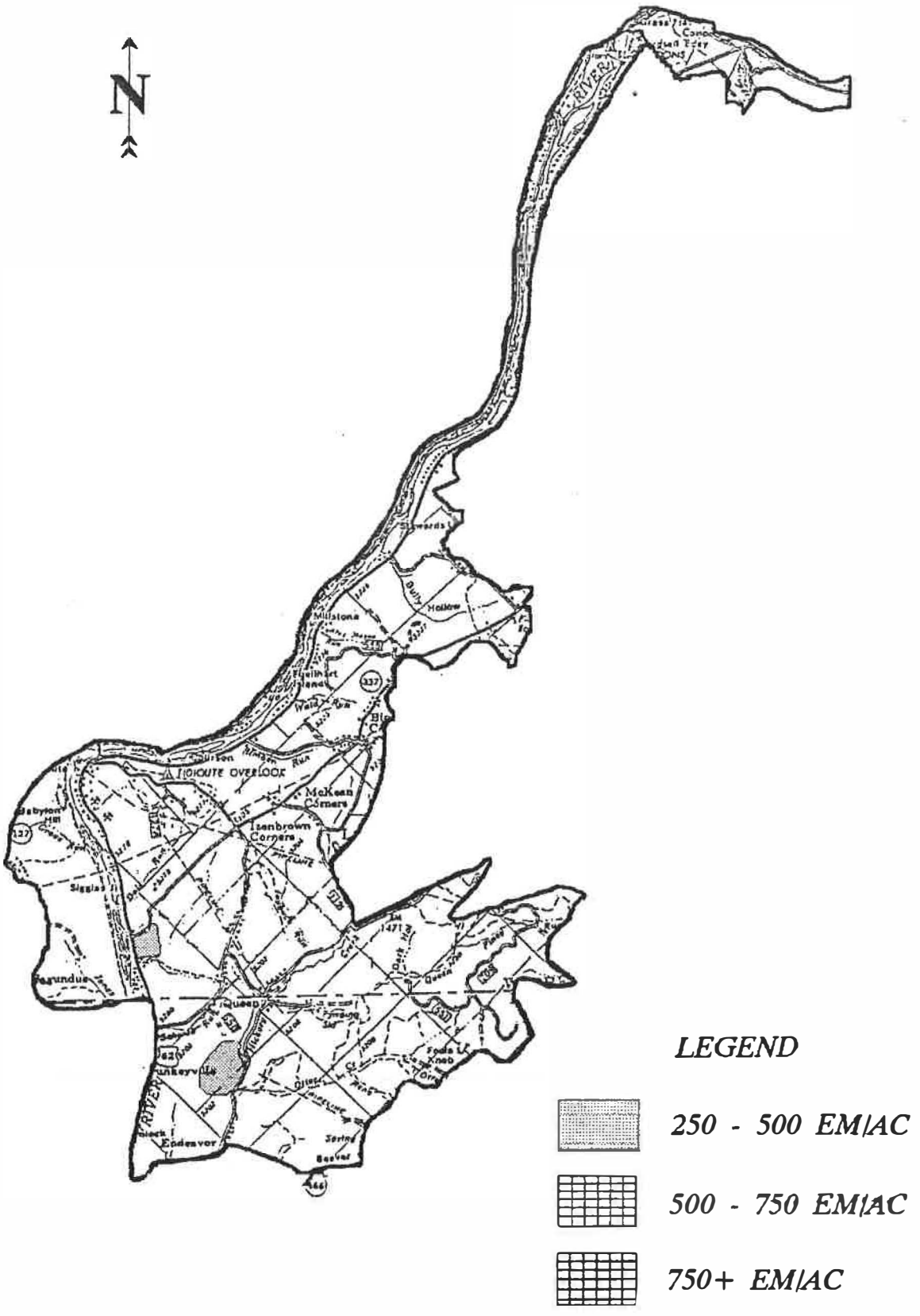

*LEGEND*

*250 - 500 EM/AC*

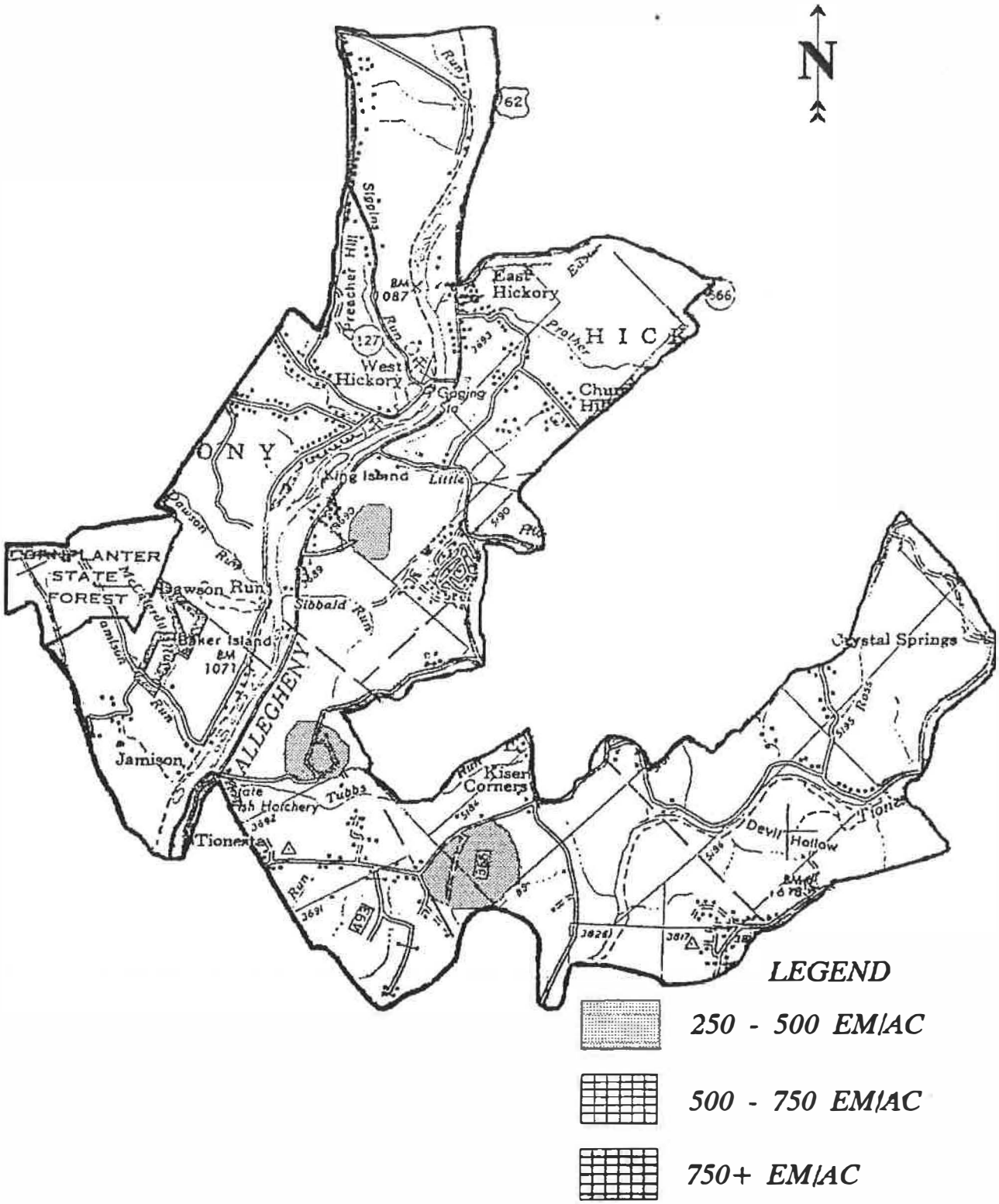
*500 - 750 EM/AC*

*750+ EM/AC*

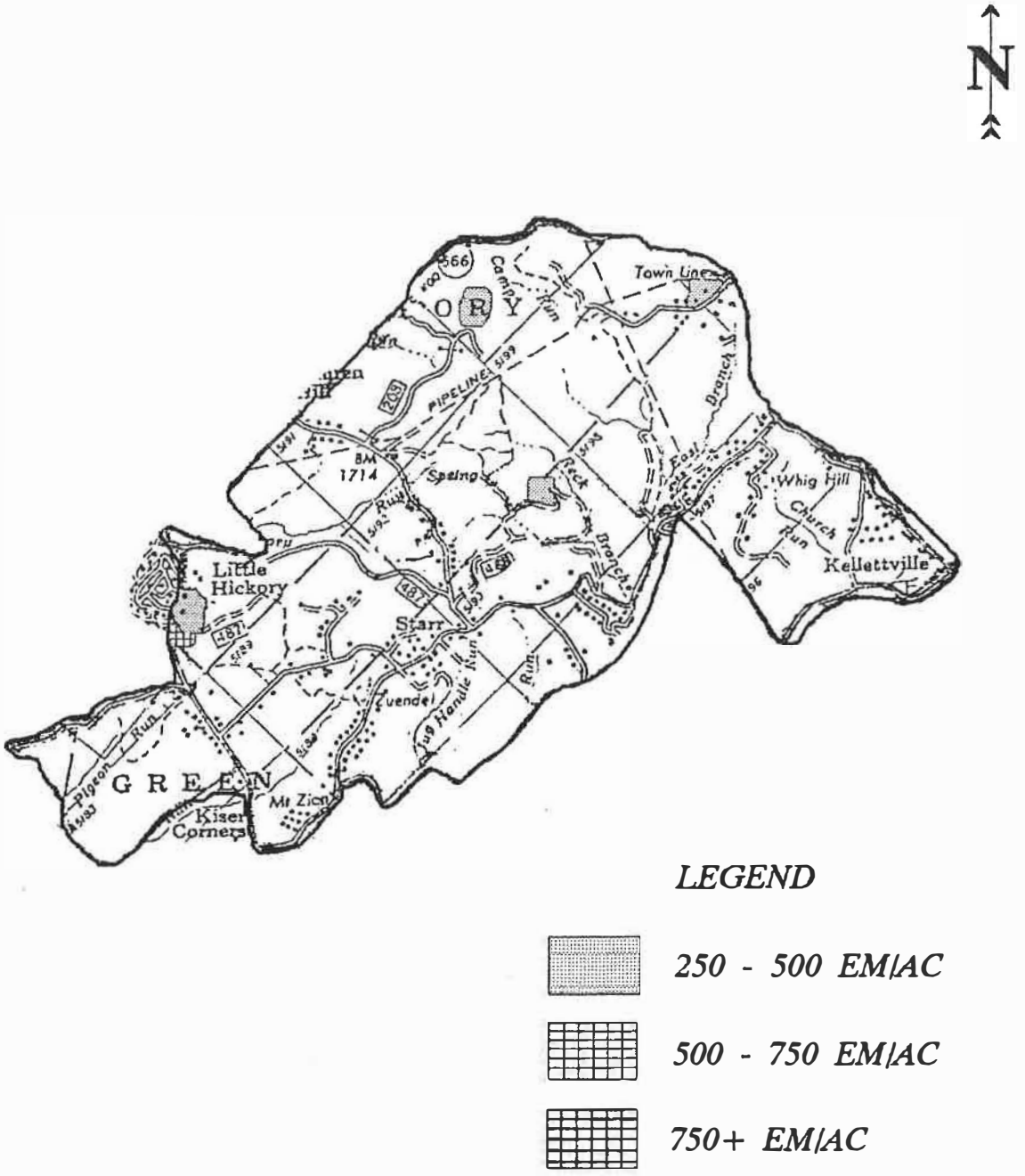
Opportunity Area S16M, Allegheny National Forest,
Egg Mass Densities, November, 1990



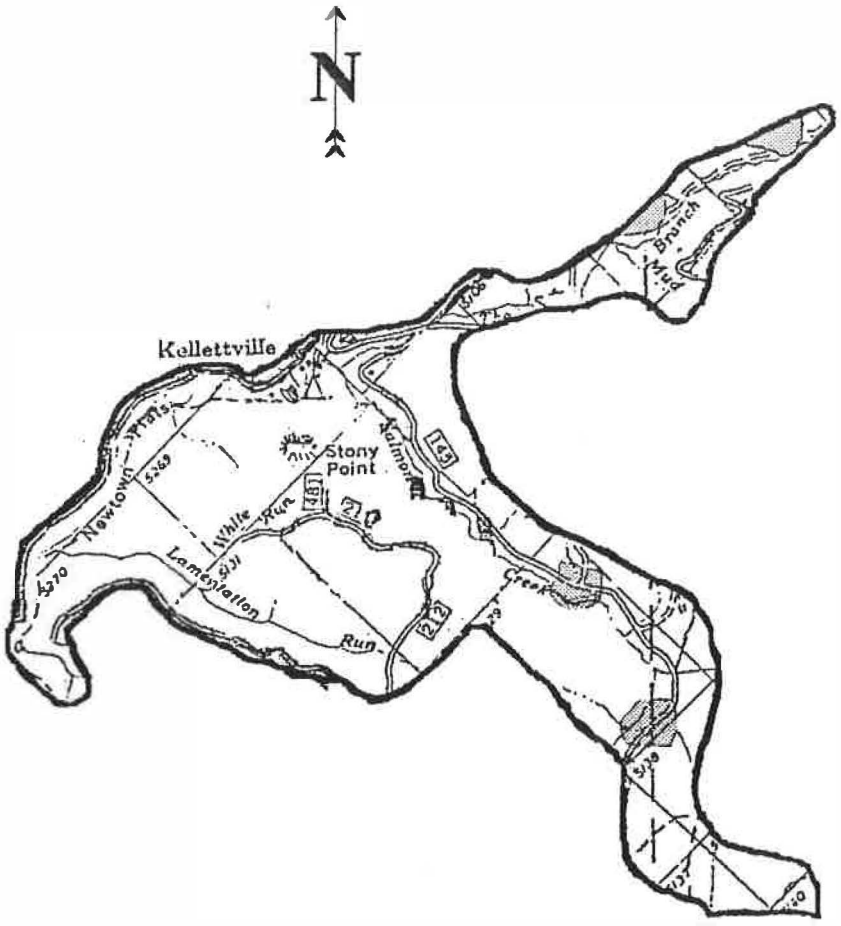
Opportunity Area M01L, Allegheny National Forest,
Egg Mass Densities, November, 1990



Opportunity Area M03L, Allegheny National Forest,
Egg Mass Densities, November, 1990



Opportunity Area M04H, Allegheny National Forest,
Egg Mass Densities, November, 1990




*LEGEND*

*250 - 500 EM/AC*

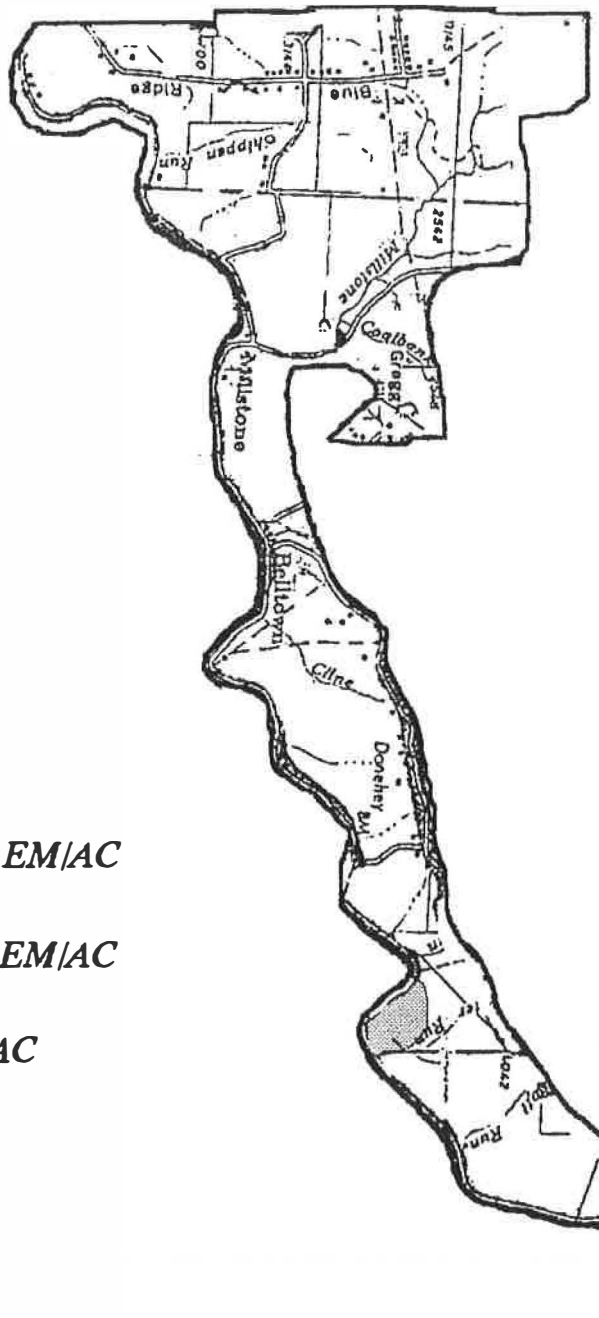
*500 - 750 EM/AC*

*750+ EM/AC*

Opportunity Area M07H, Allegheny National Forest,
Egg Mass Densities, November, 1990



Opportunity Area M12M, Allegheny National Forest,
Egg Mass Densities, November, 1990




N

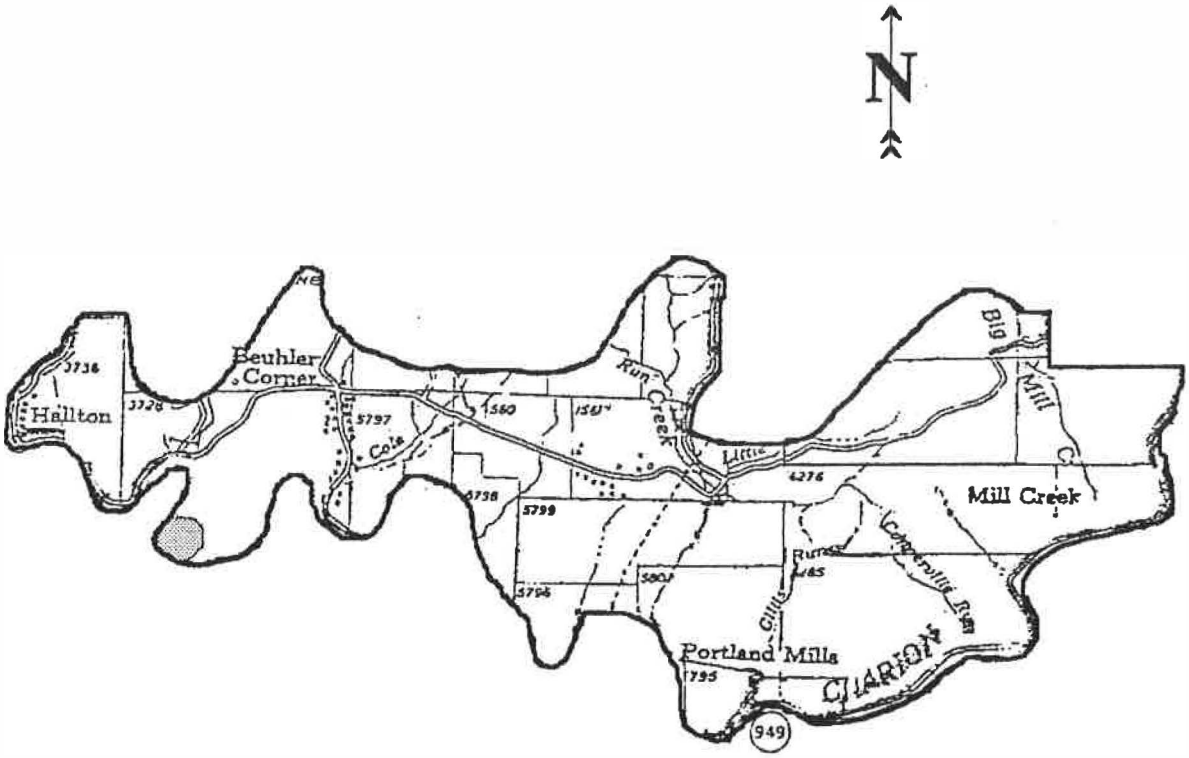
*LEGEND*

*250 - 500 EM/AC*

*500 - 750 EM/AC*

*750+ EM/AC*

Opportunity Area M12M (Ridgway RD), Allegheny National Forest,
Egg Mass Densities, November, 1990




*LEGEND*

*250 - 500 EM/AC*

*500 - 750 EM/AC*

*750+ EM/AC*

United States Department of Agriculture | Forest Service | NA | MFO

Reply to: 3460 November 6, 1990

Subject: Gypsy Moth Biological Evaluation - Allegheny National Forest

To: Forest Supervisor, Allegheny National Forest

Enclosed is the "Biological Evaluation of Gypsy Moth Populations, Allegheny National Forest, Pennsylvania, 1990". This report includes gypsy moth egg mass survey results and recommendations for treatment in 1991.

Gypsy moth populations are increasing throughout the Allegheny National Forest and it looks like suppression activities may be warranted for the spring of 1991.

Bob Acciavatti will be visiting the Allegheny National Forest on November 20, 1990, to meet with Bob White and possibly others to discuss the results and implications of this survey. If you have any questions concerning this survey or other pest problems, please give me a call. We appreciate your cooperation and assistance with our pest management activities and are looking forward to working with the Allegheny National Forest staff in the coming year.

Kelly S. Riddle

KELLY S. RIDDLE
Forestry Technician
Forest Pest Management

Enclosure

cc: AO
District Ranger, Bradford RD
District Ranger, Marienville RD
District Ranger, Ridgway RD
District Ranger, Sheffield RD
L. Yarger, R-9
B. Towers, PA DER-BOF

KSR/mae